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ROCHESTER INSTITUTE OF TECHNOLOGY

A Thesis Submitted to the Faculty of  
The College of Fine and Applied Arts  
in Candidacy for the Degree of  
MASTER OF FINE ARTS

BEDOUIN TEXTILES OF SAUDI ARABIA

by

Celia Wright

May 1982

Thesis Proposal for the Master of Fine Arts Degree

College of Fine and Applied Arts  
Rochester Institute of Technology

Title: Bedouin Textiles of Saudia Arabia

Submitted by Celia Wright

October 2, 1981

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During the past year I have had the opportunity of working closely with a collection of Saudi Arabian woven textiles and other crafts. These textiles are characterized by the combination of a great variety of techniques, indicating a diffusion of techniques between the Arabian Peninsula and adjacent cultures. The frequent combination of both warp-faced and weft-faced structures within a single woven piece is particularly fascinating, as it rarely occurs in other cultures.

This thesis will research the techniques and designs used in Saudi weaving and in the weaving of adjacent and related cultures in Africa and the Middle East which historically have had exchange with the Arabian Peninsula. It will focus particularly on the occurrence and diffusion of combined warp- and weft-faced textiles; it will attempt to examine the relationship between these structures and the technologies used to produce them, and between technology and other ethnological factors in a given region; it will attempt some conclusions about why these textiles occur where they do.

The research will be elucidated where necessary with illustrations and maps.

## APPROVALS

Advisor: Donald Bujnowski

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Associate Advisor: Anthony Landreau

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Date: May, 1982

I have read the thesis report of Celia Wright and  
offer the following comments:

This thesis is really excellent. It covers  
ground not previously researched - Saudi Arabian  
Textiles in a thorough and technically accurate manner.  
Celia consulted with me frequently during its development.  
Her plan was well conceived and well executed. She  
has a fine grasp of textile technology and she would  
make an excellent museum curator. This  
thesis is an important contribution to Textile  
literature and should be published.

I recommend its acceptance ☒

I recommend its revision ☐

Anthony Landreau

Signature of Advisor

5/19/82  
Date

I have read the thesis report of Celia Wright  
and offer the following comments:

An excellent job. Conclusions logically developed and  
clearly presented. I made only a few relatively minor  
suggestions for changes and am fully satisfied with the  
final result.

I recommend its acceptance ☒

I recommend its revision ☐

Bret Waller

Signature of Advisor

5/26/82

Date

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## INTRODUCTION

This thesis evolved from my work in 1981-82 on the exhibit 'Traditional Crafts of Saudi Arabia,' and on the related catalogue. Bedouin textiles referred to are from the collections of John M. Topham and others, which appeared in that exhibition. Mr. Topham's encouragement and cooperation throughout the work are gratefully acknowledged.

A discussion connected with the peoples of Saudi Arabia requires some clarification of the terms 'Arab' and 'Bedouin.' 'Arab' is a broad term probably not capable of precise definition. To the extent that they agree, authorities attribute to it a linguistic, cultural, religious, and historical distinction, as encompassing those people who identify with the Conquest of Islam and the language and culture which accompanied it. In addition,

[t]he association with nomadism is borne out by the fact that the Arabs themselves seem to have used the word at an early date to distinguish the Bedouin from the Arabic-speaking town and village dwellers . . .<sup>1</sup>

The term 'Arab' is still thus used in Saudi Arabia and neighboring Middle-Eastern countries.

'Bedouin' is a similarly loose term. In Saudi Arabia it refers to nomads and semi-nomads who raise camels or sheep, but the

term is not used by the Bedouin themselves, who refer to themselves as Arabs.<sup>2</sup> It is used by some authors also to apply to sedentary persons of Bedouin extraction for several generations after they settle.<sup>3</sup>

In Traditional Crafts of Saudi Arabia, Topham divided the textiles of Saudi Arabia (excluding costume) into three groups,

- 1) Bedouin or Nejdi textiles
- 2) Southwestern textiles, and
- 3) Northeastern textiles,

according to geographical source, technical and technological features, and, to some extent, ethnic origins.<sup>4</sup> In this thesis I am concerned with the first group, the Bedouin textiles, and only secondarily with the other two groups. (The Nejd is the central province of Saudi Arabia, and has been the political center of the Peninsula for some years. The textiles from that area are almost exclusively in the Bedouin style, hence the identification of the region with the style.) 'Bedouin textiles' here denotes pieces which:

- 1) are intended for nomadic use,
- 2) are produced by hand on the Bedouin loom, described later, and
- 3) are characterized by certain features of design and technique, also described later.

These textiles may be woven in the towns and villages, as well as by the nomads themselves, and still be considered 'Bedouin.'

## A HISTORY OF WEAVING AND WEAVING TECHNOLOGY IN THE ARABIAN PENINSULA

The roots of Bedouin weaving extend back to the prehistory of the Arabian Peninsula. Until recently this area was ' . . . a blank space on the archeological map of the ancient world.'<sup>5</sup> The beginning of serious archeological exploration of the Peninsula is a fast-breaking story, and the map is still far from complete, but already the evidence points to a richer and more complex history than had generally been understood for this area.

Like the Sahara Desert, the prehistoric Arabian Peninsula was covered with lakes and grassland which supported a population of hunters or hunter-gatherers, presumably without a well-developed material culture. When the lakes began to dry up, sometime around 7000 B.C., the population was forced to migrate northward toward the Persian Gulf. By the Fifth Millenium the area was thickly settled by Neolithic farmers who had domesticated sheep and goats, fished the Gulf, and, from the evidence of pottery finds, must have had contact with Mesopotamia. In fact, the archeological evidence seems to indicate that from the earliest times the Arabian Peninsula has had extensive contact with all the civilizations of the Fertile Crescent.<sup>6</sup> Sites on the Island of Bahrain are identified as

harbors of the Dilmun culture, intended to serve trade between Mesopotamia and the Indus Valley.<sup>7</sup> Trade in incense and spices from the southern Arabian Peninsula to India during ancient times is well documented. Later this trade included cotton in the form of both yarn and cloth.<sup>8</sup>

It is now accepted that nomadism, far from being a carryover from some prehistoric stage in man's cultural development, is actually a recent development and followed the rise of sedentary pastoralism.<sup>9</sup> Pastoral nomadism involves the subsistence herding of animals who are exploited primarily for their milk, and secondarily for meat, hair, or hides, in areas of marginal resources requiring frequent movement in order to provide grazing for the animals. Both pastoralism, i.e. shepherding, and nomadism can and do exist independently of each other.<sup>10</sup> The Gypsies of Europe are nomadic without being pastoral, and many African societies rely on sedentary pastoralism. It is also worth noting that the distinction between nomadic and sedentary people is rather fluid, since a given group may well change from one to another and back again in response to changes in environmental circumstances such as drought.<sup>11</sup>

Nomadism is the only means by which parts of the Arabian Peninsula, much of which may not receive rain yearly, can be occupied, and it is certain that nomadism was well developed there by Biblical times; it is the way of life of the Patriarchs as described in the Old Testament.<sup>12</sup> Since nomadic pastoralism



represents an adaptation to survival in an extreme environment, it is not surprising that nomads are conservative people--their environment leaves little room for error or experimentation.<sup>13</sup> Indeed, many aspects of nomadic life in the Middle East changed little until well into the present century.

The rise of Islam had notable effects on the history of the Peninsula. The hajj, or pilgrimage to Mecca, already had a long history even in the days of Muhammad. He purged the pilgrimage of its polytheistic elements and incorporated it into his teachings. With the spread of Islam to the rest of the Near East and beyond, the hajj expanded to bring into Arabia people from the farthest reaches of Asia and Africa, and with these pilgrims came the diversity of influences and products of the lands they came from.<sup>14</sup> At the same time, Islam is credited with bringing a certain exclusiveness to the culture, in that until recently it was deliberate policy to exclude non-Muslims from the land where the faith originated.<sup>15</sup> Thus the society of Saudi Arabia has been selective about the influences that have entered it.

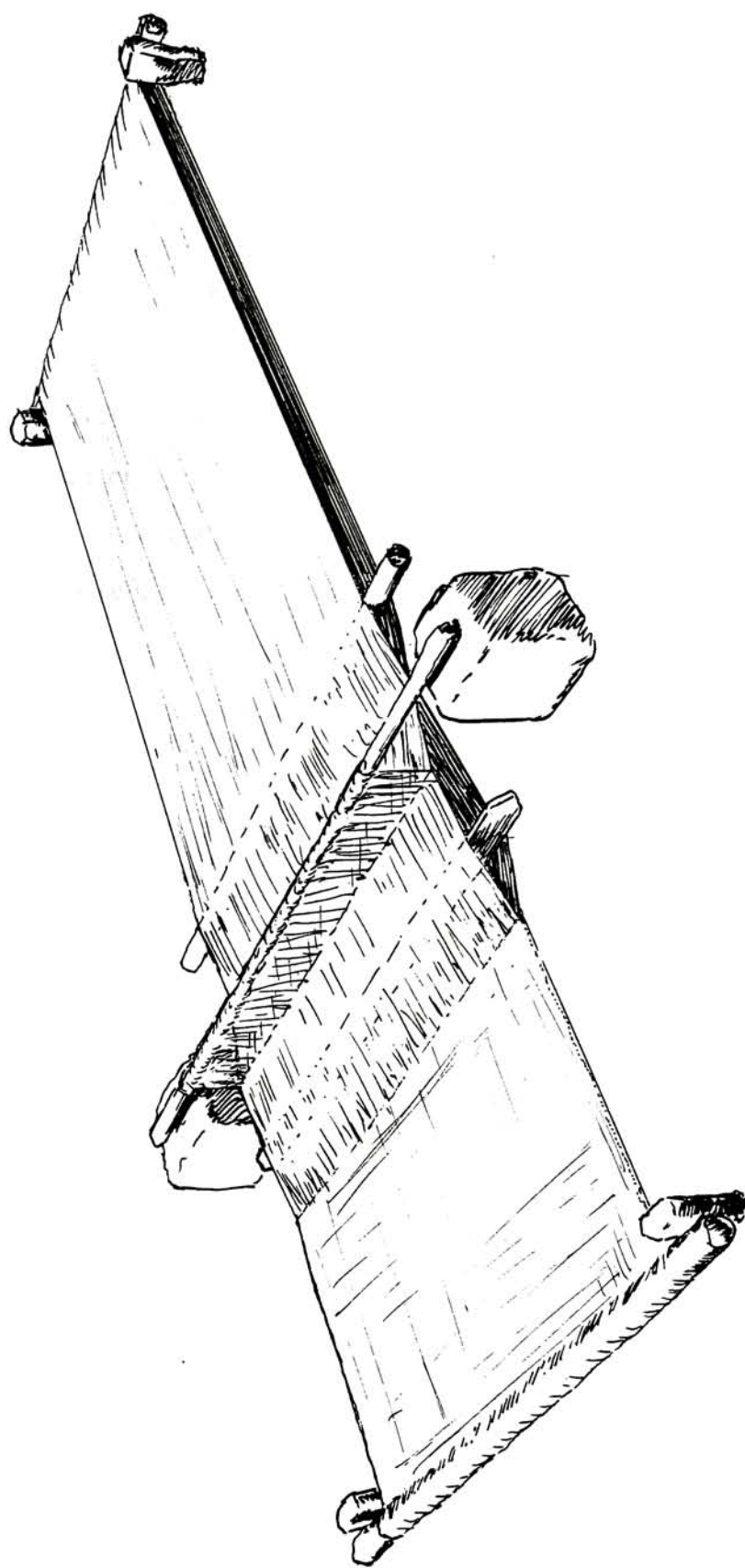
The history of particular textile fibers in the Middle East is a key to understanding the technology and techniques of Bedouin weaving. Sheep and goats were the original basis of nomadic pastoralism, camels having been domesticated later. Sheep and goats came originally from central Asia, from where they spread to Asia Minor, the rest of southwest Asia, the Arabian Peninsula, and Ethiopia at a very early date.<sup>16</sup> The original sheep were

hairy, not wooly, so their fleece would not have made comfortable clothing. They were not originally kept for wool, and even now the wool of the Bedouin sheep is still relatively hairy. Wool mats if it is pulled or combed from the animal, and this method yields very small amounts. Shears, moreover, were not invented until the Iron Age. Goat hair does not suffer from all these deficiencies, although it is coarse and uncomfortable, so it may have been utilized for weaving much earlier than wool. If Neolithic pastoralists were weavers at all, they must have woven with goat hair rather than wool, but it is likely that they used animals skins, rather than woven fabric, for clothing, shelter, and containers.<sup>17</sup>

It might seem inevitable that felt would be an intermediate step between animal skins and weaving, since the felting process occurs naturally when sheep skins are worn.<sup>18</sup> There is no evidence, however, that felting was known or used, and the development of textiles may not have been so step-wise and orderly.

Meanwhile, in Egypt the cultivation of flax and production of linen cloth were developed. Evidence for an early date--at least 2000 B.C.--for this event comes from numerous tomb paintings and models.<sup>19</sup> Land in the Nile Valley was too precious and intensely cultivated to be used for shepherding, and no other fiber was used regularly there until much later.<sup>20</sup> Linen trade was a significant part of the Egyptian economy. The first linen





Bedouin loom

loom was a horizontal loom with a shed stick and string heddle, and was operated by two weavers. The Egyptians are generally credited with inventing rather than borrowing this loom.<sup>21</sup> It was used to weave warp-faced cloth, according to Wilson because shedding was difficult on this loom and warp-faced cloth requires fewer sheds than other ways of weaving.<sup>22</sup> The Egyptians developed the art of spinning linen on drop spindles, giving it an 'S' or left-handed twist since flax fibers naturally twist that direction when they are processed.

The Bedouin loom of today closely resembles the Egyptian horizontal loom, and is descended either directly or indirectly from the Egyptian prototype. It seems certain that there was culture contact between the skin-wearing nomads of the Arabian Peninsula and the linen-weaving Egyptians through trade and possibly through migrations of nomads across the Sinai to the Nile Valley.<sup>23</sup> It is just as possible that the loom came to them indirectly through Mesopotamia or another early civilization of the Tigris-Euphrates region, since this area is associated with the early use of wool. (A similar loom is still used by nomadic groups of Asia.) The Bedouin loom, like the Egyptian horizontal loom, consists of two beams staked into the ground with the warp stretched between them, and a heddle rod and shed stick for making the openings in the warp. The Bedouin loom is generally narrow, although it may be operated by from one to three weavers, and unlike its Egyptian prototype the heddle rod's

position is fixed by being set up on rocks (or more recently concrete blocks or empty gas cans) at each end. The loom is ideally suited to nomadic life since it can be easily rolled up with the unfinished weaving still on it and loaded onto a camel for transport to a new site. It requires a minimum of framing wood, which is a scarcity in the desert.

Bedouin tents have changed little over several thousand years, and, appropriately, the strips of goat hair cloth which are sewn together to make Bedouin tents are the product which most closely resembles Egyptian weaving in that they are long, narrow, and warp-faced. It seems quite plausible that tent cloth was one of the Bedouin's first woven articles. Exodus 26:7-8 describes the tabernacle used by the Hebrews in their wanderings:

You shall also make curtains of goats' hair for a tent over the tabernacle; eleven curtains shall you make. The length of each curtain shall be thirty cubits, and the breadth of each curtain shall be four cubits; the eleven curtains shall have the same measure (RSV).

The survival of a design or technique for so long in the same area is not unique to the tent. Another possible example comes from the excavations at Dura-Europos, where the finds included

. . . several pieces of cord of goat's hair and of vegetable fiber; and pieces of a heavy three-strand goat's hair . . . which resemble the cords and braids worn at the present time by the Arabs [in the area] as girdles and as a part of their headdresses.<sup>24</sup>

The Bedouin still spin yarn with the drop spindle. This, too, may have been borrowed from the Egyptians, although the method may have developed in any of the early textile centers, or may have arisen independently in more than one location.

The direction in which yarn was twisted in spinning in the early textiles centers has had a tenacious effect up to the present. Wool and animal fibers show no innate preference for one direction to the other. Flax fibers, as mentioned above, twist in an 'S' direction in processing. The dominance of Egypt as an early textile center in developing flax has led to a traditional prevalence of S-twisted yarn in the Eastern portion of Africa.<sup>25</sup> In Asia, Z-twist predominates in the yarn of Oriental rugs, although spinning in both directions has been documented for the Baluch in Pakistan and Afghanistan and the Bedouin of Syria and Palestine.<sup>26</sup> It is not surprising that the Arabian Peninsula, lying directly between the Asian rug belt and Africa, would show both directions of spin. Predictably, S-twist predominates in the southwest, close to Africa, and Z-twist predominates in the north and northeast, nearest the rest of Asia. What is surprising is the existence side by side in numerous pieces of yarns of different twists, following no apparent rule.<sup>27</sup> Konieczny noted that the spin of Baluch yarns is associated with the method and position (sitting or standing) assumed by the spinner. Crowfoot noted that among Bedouin women of Palestine although one direction of spin was usual, it



was reversed for the spinning of goat hair. She does not specify which direction was used for which fiber, but here again there is the implication in the wording of the passage that method of spinning is closely related to the direction of twist used. In addition, the diffusion of yarns through trade may account for the mixture of yarns found; Topham, among others, reports several instances of the sale of yarn by Bedouin women. Members of tribes involved exclusively in camel herding would have to acquire wool and goat hair by trade. These examples shed some light on the possible reasons for the use of both twists in the textiles of one Bedouin family.

The history of cotton is relevant in that it is responsible for a second type of loom found in the Arabian Peninsula. Cotton was originally spun in the Indus Valley sometime around 2000 B.C., and requires rather different methods for both spinning and weaving from wool.<sup>28</sup> A cotton warp must be spaced evenly on the loom to prevent the fragile yarns from tangling and breaking; hence the development of the weaving reed, for both spacing and beating in. The weaver needs two free hands to pass the weft gently through the warp; hence the tying of the heddle rods to foot treadles. Since Indians generally sat on the ground it was natural for them to dig a pit for the foot treadles, rather than to raise the loom.<sup>29</sup>

Roth terms the resulting weaving tool the 'Hindu loom' or 'pit treadle loom.'<sup>30</sup> It may have two or four harnesses which are

more elaborate heddles, a cloth beam on which the finished cloth is rolled, a beater suspended from above (by cords on some looms) holding the reed, and the warp tensioned by tying it to a wall or upright post. That the loom came from India with the importation of the cotton plant is in little doubt; since trade between India and the Arabian Peninsula is documented from very early times it is possible that this loom has survived unchanged in Eastern Arabia, Persia, Yemen and the Sudan for two thousand years or more.<sup>31</sup> Nomadism has always required a close symbiotic relationship between nomads and villagers, the villagers supplying goods and foods which the nomads cannot produce themselves. De Boucheman in his inventory of Bedouin garments indicates that the fabric for clothing was nearly always purchased in the villages; by and large, before the time of machine woven goods and into the present this fabric was woven on the pit loom.<sup>32</sup> In the Middle East today it is used for weaving many fibers, and provides the Bedouin with textiles they cannot produce themselves.

Current handweaving technology in Saudi Arabia consists of these two looms, with yarn either commercially spun or spun on the drop spindle. There are some interesting contrasts between the two looms which represent both an economic and a social division. First, the pit treadle loom is operated by men exclusively in most of the places it occurs in the Middle East and Africa; the horizontal ground loom, since its beginnings in

ancient Egypt, has been used by women. Correspondingly the pit loom is used for commercial manufacture of textiles, with the Bedouin loom reserved primarily for textiles for domestic use. The pit loom is associated with the town and city. The Bedouin loom is less ideally suited for village use, where it requires precious space, than for nomadic life, where its simplicity and portability are its salient virtues; nevertheless, it has been retained in the villages. This observation by Carleton Coon sheds some light on this deviation:

. . . high skills require full-time specialists. In all societies woman's primary work is being a housewife and caring for her children . . . . Brewing, baking, pottery making, milling, and the like, along with weaving, are women's work. Hence, as each of these techniques rises to a certain threshold in its requirements of concentration and skill, it becomes the work of men.<sup>33</sup>

It is curious that no type of vertical loom is reported in the Arabian Peninsula, when several sources report some form of it in the surrounding areas of Palestine, Syria, Egypt, Africa, and the traditional Oriental rug belt.<sup>34</sup> It is sufficiently portable to be used in some form by nomadic Berbers and Bedouin of North Africa.<sup>35</sup> This loom also seems first to have been developed by the Egyptians, and the history of culture contact suggests that it might be present somewhere on the Peninsula.<sup>36</sup> In addition some of the weft-faced textiles of the settled areas of southwest Arabia could as easily have been woven on a vertical loom as on the Bedouin loom. No reference to such a loom has been found, however.

## DESIGN AND TECHNIQUE IN BEDOUIN TEXTILES

Two related questions need to be dealt with in any further examination of Bedouin textiles:

- 1) Why do warp-faced structures predominate in Bedouin weaving?
- 2) Why has the Bedouin loom been retained virtually unchanged for so long?

The first question arises because elsewhere in the Middle East essentially the same technology is used to produce predominantly weft-faced and pile structures: The loom does not dictate the structure. This along with the Egyptian source of both the loom and the warp-faced structure in Saudi Arabia might be taken to suggest that sheer conservatism is the cause of both retentions.

The second question arises because elsewhere there are other looms which are sufficiently portable to be suitable for nomadic or itinerant use, namely, the vertical loom used by North African Berbers, and the men's narrow band loom used by many groups in West Africa.<sup>37</sup>



The answer to both questions seems to be that the Bedouin loom and the warp-faced structure are part of a complex of factors of great antiquity which also includes the overspinning of yarn, use of hairy wool, the need for extreme durability, decorative use of weft twining, a preference for geometric figures, a peculiarly Bedouin sense of space, and yes, conservatism. These all function together toward a unified product, and to alter any of them would be eventually to change the whole result.

The overspinning of yarn is evident both from the toughness of the fabric and from the fact that pairs of warp ends have usually back-twisted at the unfinished ends of a piece. It is necessary to overspin wool for a warp-faced structure to prevent a sticky warp that is impossible to pull apart for a shed. Overspinning and a hairy, rather than fleecy, wool contribute greatly to durability, and a warp-faced fabric has greater tensile strength than others simply because it has more fibers running longitudinally.

The warp-faced plain weave is generally embellished by any of several variations. The simplest and most common is the ubiquitous warp stripes, either in solid colors or developed to the extent of alternating colors in the treading of the warp to make transverse bars of the two colors. This is called 'camel teeth' according to Topham. Beyond this, simple warp substitution is used, usually in black and white, to form geometric figures within

warp-wise stripes. The upper face of the fabric remains plain weave of the same density as the rest of the piece, with the back showing the unused color as a pattern of warp floats. Warp substitution is set up by threading the extra warps through the same heddles as the ground warps in 'sister' pairs. The weaver picks up the color she wants to show in a given area.<sup>38</sup>

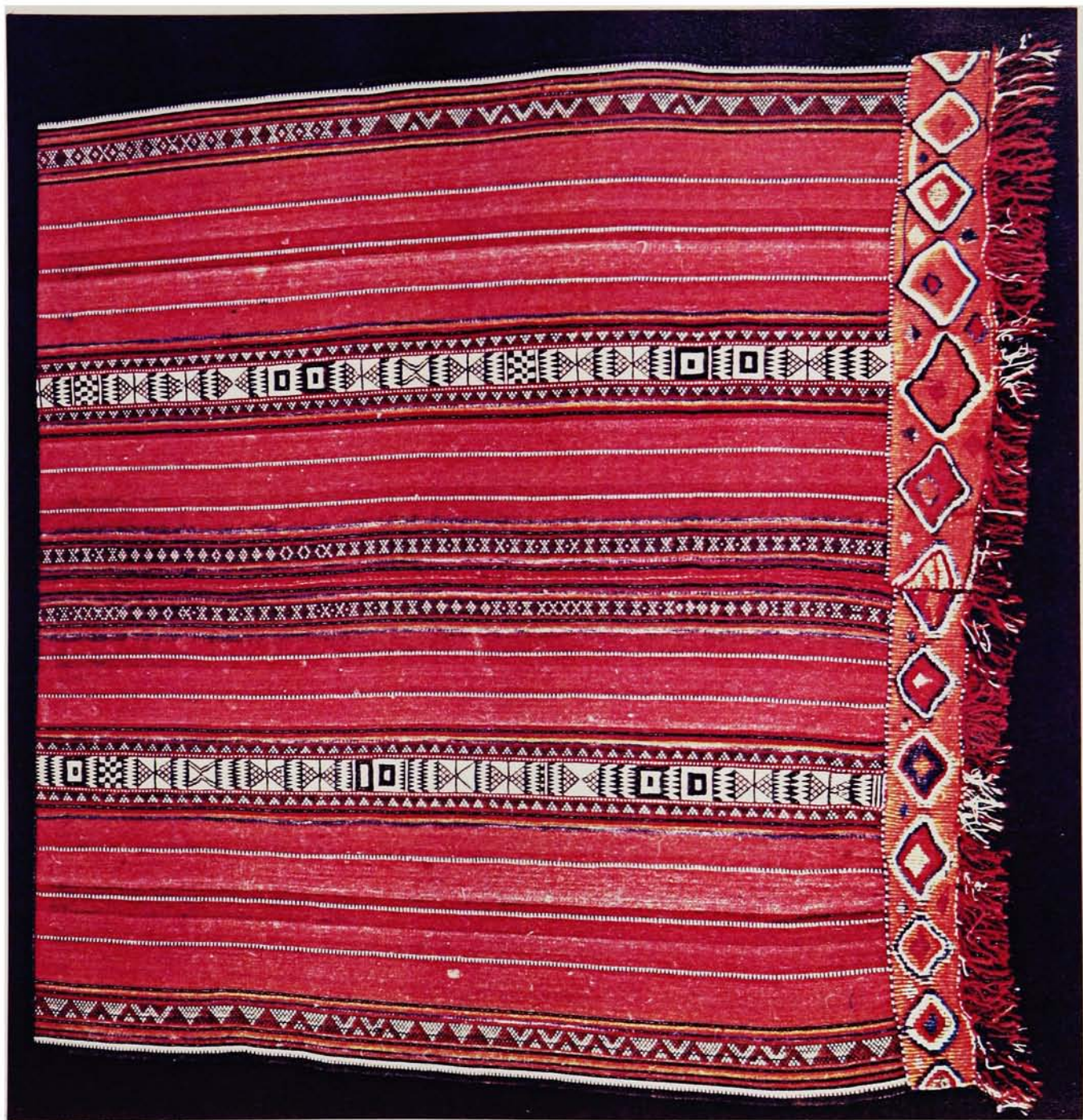
According to the al Sadu portfolio this type of design of geometrics within a stripe is called al-sharijah (tree), and gives the weaver an opportunity for some individual expression.<sup>39</sup> A warp substitution design called llwairijan may provide borders for the sharijah stripes or be the principal decoration on more modest pieces.<sup>40</sup> It is warped (if on a black ground):

B	B	B	W	B	W	B	B	W	B	W	B	B	W	B	W	B	B	B
			R		R			R		R			R		R			

The pairs of red or white pattern warps always show up on alternate sheds as a spot of color surrounded by black. This arrangement is worked in inverted triangles, diamonds, or hour-glass figures, with the red and white alternating.

Twining is the exception to warp-faced structures in Bedouin weaving. It is always weft-faced twined slit tapestry, started by folding a single yarn into two ends which produce a solid color area. Patterns produced are geometrics based on the triangle. Twining, much more than the warp-faced structures, carries over into the ornamentation woven onto leather pieces, small bags, and





This rug shows the essential features of Bedouin weaving: The wide black and white design motifs are sharijah, bordered with llwairijan, which is also found at the rug's center and edges. The rug is made in two strips, and has a twined band at the ends. On the selvedge edges is 'camel teeth' motif. Collection of John M. Topham.



costume, where it may be done with cotton, rayon, or fine leather thongs. Its use always serves a decorative purpose in that it is never seen as a large single-color area. This structure seems to have come to Arabia from Africa, where it is sometimes used for the bodies of fabrics.<sup>41</sup> It is seen in other Middle Eastern textiles only as narrow bands at the ends of woven pieces.

The twined tapestry, when used on woolen textiles, is virtually always combined with the usual warp-faced structures, and this combination is the unique feature of Bedouin textiles. Such combinations of techniques generally present problems in the form of uneven warp tension and changes in the width of the weaving from one area to the next. In Bedouin weaving the first problem is overcome by the use of the springy, overspun warp. While some variation in weaving width is tolerated, it is largely overcome by twining around four, six, or eight ends as a single working end. As a rule twined areas are worked in solid bands from selvedge to selvedge, although one piece in Topham's collection shows small twined diamond and triangle motifs with carefully stepped edges isolated in a warp-faced area, with the warps changing neatly from a 1/1 interlacement to groups of four. While the difficulty of making a shed on the Bedouin loom makes a warp-faced structure attractive, the twining is doubly so because it requires no shed at all. In addition, the twisting of the twined wefts makes it a considerably more durable structure than plain weave.

Few cultures have produced textiles combining warp- and weft-faced structures; generally in any weaving culture one structure has been developed in preference to the other.<sup>42</sup> Certain Indonesian fabrics employ weft twining on the ends of primarily warp-faced ikat pieces. These fabrics are of cotton or silk and so have a very different appearance and hand from the Saudi work. The Indonesian designs in the borders are generally worked in black, red, and white and are more linear than geometric. The twining is done off the loom, with the warp threads being pulled through the twining wefts, which are lightly tensioned. The warp threads are used in groups of two to six threads, that is, in different combinations within one piece, and the warp groups are divided staggered for each row. The twining is done with two threads of different colors. In the case of the Indonesian pieces the twined areas are actually narrower than the rest of the cloth.<sup>43</sup> These differences in ways of working and in designs produced may indicate that there is little historical connection between the two, in spite of historical links between Indonesia and the Arabian Peninsula.

Kurdish tribes have historically had contact with Bedouin tribes along the border between Iraq and Saudi Arabia, and Kurdish textiles provide a point of comparison with the Bedouin work. None of them shows the Arabian combination of warp and weft-faced structures, but both structures are represented in the various types of Kurdish weaving. The warp-faced strips of the

Iranian Kurds, sometimes grouped under the broad term jajim, which are seamed together to make covers and blankets, are so similar in technique and structure that they might almost be miniature versions of the Saudi warp-faced work, but they are generally very narrow and are woven with much finer yarns, so the visual resemblance is not great. There is less variation within a single piece in the Kurdish warp substitution work, with one motif or sequence of motifs generally repeated throughout the piece, and Kurdish colors differ significantly from those typical of Saudi Bedouin. Weft-faced Kurdish nomadic pieces are generally slit tapestry or weft brocade.

West African men's cloths are perhaps the most intriguing in their similarity to Bedouin textiles. Here there is a straightforward combination of warp- and weft-faced weaving, though the weft-faced structures are not twined but plain weave with brocading and other compound weft weaves.<sup>44</sup> The Ewe and Ashanti men's cloths are composed of narrow strips of fabric with design units (usually alternating) of warp-faced and weft-faced weaves. The units are usually deliberately arranged to form a pattern when the strips are sewn together. Sometimes the arrangement is a simple checkerboard, sometimes it is something less formal. Many Bedouin pieces resemble this in that warp-faced and weft-faced areas are alternated and their arrangement deliberately planned to form a pattern (if not an exact match) when they are assembled. Some of the large tent





A portion of a tent dividing curtain woven in strips and alternating areas of warp-faced plain weave and welt-faced twined tapestry. Collection of John M. Topham.

curtains from northern Saudi Arabia are quite remarkable for their similarity to the African pieces--they are worked on solid white or solid black warps, usually alternating strips of each when assembled, and the two are unified by the areas of very busy pattern in weft twining. Even more similar to these are the rugs and tent curtains woven on the Niger bend for the Tuareg, made in narrow strips with cotton and wool, and patterned with weft inlay. These pieces ' . . . yield a design of patterns across the fabric at right angles to the direction of the warp threads . . . ' much as some of the Arabian pieces do.<sup>45</sup>

It seems usually to be the African weaver's intention to keep selvages as straight as possible, but in some of the assembled cloths the slight scalloping of selvages contributes to the overall effect. Of course, the Ashanti and Ewe pieces are of cotton and silk, much lighter weight than the Bedouin work, and the strips are always quite narrow--four to five inches. There also is little similarity between Bedouin and African weaving in the warp figures, with ikat and simple pick-up work favored in the African examples, but the use of border stripes in the narrow warps invites comparison. The history of this type of weaving is documented as far back as 1000 A.D., but not before that, and it is known that the standards of modesty brought by the rise of Islam, as well as new techniques and materials, caused vast changes in the type and quantity of clothing worn in parts of West Africa.<sup>46</sup> Venice Lamb points out that ' . . . it is not



uncommon to find in the Islamic world cloths which are made up of several elements sewn together selvage to selvage . . . ' and theorizes that the weaving of narrow strips, along with the use of cotton, originated in the Nile Valley, or possibly elsewhere in the Middle East.<sup>47</sup> So while it seems certain that there is an historical connection, it is little more than speculation to conclude that one textile is the antecedent of the other. To confuse matters further, the African cloths are exclusively the product of male weavers working on a loom which has more in common with the pit treadle loom or the modern European foot treadle loom than with the Bedouin loom.

Finally, the similarity in layout and feel between the Saudi Bedouin textiles and Arab and Berber nomadic textiles of Morocco is worth noting. Many of the latter seem to be the exact weft-faced counterparts of the Bedouin work, turned ninety degrees, even though there is little technical similarity. The Moroccan pieces are characterized by horizontal bands of pattern against a horizontally striped background, with some pieces employing secondary vertical stripes of pattern. 'The organization does not proceed toward a climax or center but instead, there is an evenly sustained succession of equal parts. This can perhaps be related to a non-hierarchic society and a nomad life style,' according to Bert Flint, who also notes the more confined and formal sense of space in the weavings of

long-settled groups in Morocco.<sup>48</sup> His observations are certainly applicable to the Bedouin textiles.

Wool is the Bedouin's preferred weaving material, for reasons not so obvious as they might seem. Not all nomadic Bedouin raise sheep and goats so they do not necessarily have ready supplies of either wool or goat hair. Goat hair is by far the preferred fiber for tents both because of its great strength and because its natural black color provides more shade than a lighter color would. It may be that in the past (before the importation of tent cloth from Syria) most goat hair was set aside for tents.<sup>49</sup> In addition goat hair is a rougher, coarser fiber than wool, as anyone knows who has worked with it, and this may have caused it to be less popular. Presumably all nomads have a supply of camel hair, but camel hair is the exception in the Bedouin weaving. Bertram Thomas writes that the Al Murrah Bedouin of the Empty Quarter, who keep only camels, made everything, including tents and ropes, of camel hair.<sup>50</sup> But camel is a softer fiber than wool, wearing less well in bags and rugs, and it may well have been set aside for clothing or for sale in the towns where it would become prestige garments. Finally, wool is white more often than the other animal fibers, making it dyeable, and wool's receptivity to dye is well known. Color is something of a necessity in the drabness of the desert, so affinity for dye is no small advantage.<sup>51</sup>

The question of symbolism in Bedouin textiles is difficult to deal with simply because of the dearth of first-hand information. Some of the warp substitution figures have names (see p. 16), but these seem to apply more to the techniques employed to obtain certain types of motifs than to the specific motifs. It is intriguing to speculate on what 'tree' might refer to when there is so little resemblance between that object and the multitude of figures the term includes.

Wasms, the tribal and lineage markings used to brand camels, appear in some weavings according to Topham. It is somewhat doubtful, though, that these are symbols in the fullest sense of that word, rather than mere signs or identifiers. Three of the pieces in the Topham collection contain representational figures such as human figures, camels, numerals, and scissors. The pair of bags showing camel and human figures is from Jordanian Bedouin, and therefore is less valid as an indicator of Saudi practice, and the other figures are found on a rather recent rug. In this case the representational figures seem very different in character and execution from the surrounding motifs, giving the impression that they are a departure from tradition.

Both Cole and Dame Violet Dickson report that tent curtains identify the lineage and tribe of a Bedouin camp, but do not specify what motifs or combinations of motifs, colors, etc., accomplish this.<sup>52</sup> Among the Arab nomads of Morocco, Pommerol attributes symbolic meaning to woven motifs, referring to them as

'hieroglyphics' and 'ancient writing,' and implying that the names and meanings of motifs constituted an arcane knowledge which was shared with only a select few, even among the weavers.<sup>53</sup> It seems very likely that there would be close parallels in the weaving of Moroccan and Saudi nomads, but one wonders how much credence to give to Pommerol's rather romantic view. At the opposite extreme, Shelagh Weir notes that there is extensive trading of Bedouin textiles, and that the Bedouin pieces are often produced in the villages to Bedouin tastes.<sup>54</sup> It may well be that the village weavers are conversant with tribal symbols of their Bedouin clients.

Finally, there are the alternative views of Walter Denny and Schuyler Cammann on the symbolism of motifs in Asian weaving. Denny's statement that 'simple geometric forms . . . derive ultimately from the weaver's improvisation within the demands of the technique' seems to apply as well to Bedouin weaving as to Anatolian rugs, but even he allows that this 'principle of least resistance' does not account for all geometrics.<sup>55</sup> So one is bound at least to consider Schuyler Cammann's claim that if we do not know what the symbols of Asian rugs mean, it is because the original meanings have been lost through careless copying or cultural upheaval resulting from foreign influences, migration, or war.<sup>56</sup>



## CONCLUSIONS

In the physical makeup of the Bedouin textiles there is the frequent use of smaller pieces joined to form the larger whole, a practice which also characterizes much of the wood work and costume of the Bedouin. The wooden pieces in particular are made of small pieces which are assembled by binding them together with rope or rawhide. Should one of these component pieces wear out it can be replaced and the whole piece reassembled. The tent is the best textile example of this characteristic with its individual strips of cloth joined to make roof and walls. These, like the wooden pieces, may be removed and replaced. This also is paralleled in the eclecticism of costume, where patchwork, buttons, beads, shells, leather, coins, various kinds of stitchery--in short, any medium and material that can be found--are combined as part of the decoration, and portions of worn costumes are retrieved and sewn into new ones.

Anthropologists speak of something called 'technological style.' Both art history and archeology assume the existence of patterns and categories--styles--which enable objects to be grouped and classified, but it is also true that 'the activities themselves which produce the artifacts are stylistic,' and that

these behavior patterns constitute the style of a technology. Further, the style is evident 'from the gathering of the natural resources through the various stages of processing, alteration, and final rendering of the artifact.'<sup>57</sup>

In this vein I offer two ideas about the technological style of the Saudi Bedouin:

- 1) That the use of fabric itself constitutes a technological style, rather than a mere statistical predominance, and
- 2) That a further characteristic of Saudi technological style is the combining of smaller pieces to form the larger object.

In both cases the style is a response (but not necessarily the only possible response) to the desert environment, where provisions are rarely yielded in any large quantity.

As for the first statement, is there any evidence that the use of fabric constitutes a style beyond a mere choice of the best or only material for survival in a hostile climate? I believe there is.

Most of the Bedouin's furnishings are woven, from clothing to bedding and architecture. For these there is scarcely a viable alternative process or material, although before the Bedouin learned to weave, skins, which are still in plentiful supply, served all these needs. However, for those objects where whim may dictate the material, the Bedouin seem to prefer fabric. For

instance, women's headdresses and leather coffee bean bags are often embellished with woven skirts or tags which are entirely non-functional. Tiny ceramic cosmetic containers are carried in a much larger woven form. Any of these pieces may be woven not from wool or cotton, but from very narrow leather thongs, in spite of the fact that as much material and much more labor are required in order to do this.

These objects woven of leather, the large wooden pieces such as well pulleys, and the tent all are larger pieces made of smaller, independently produced components. Even in the practice of gathering wool from thornbushes where the sheep have passed the Bedouin seem to think in terms of small additive units. I believe this principle also extends to the kinship system of the Bedouin tribes, called 'segmentation.'

This system encompasses both groups and patterns of group process. Every person . . . is a member of a number of different groups--household, lineage, clan, and tribe--each one of which bears the name of a male ancestor and each one of which includes increasingly more people. . . . the process of segmentation itself, not only brings more and more groups into relationship with each other but, when coupled with their kinship terminology system, allows people to relate to each other as close relatives, even when they are genealogically far removed. It is perhaps the fluidity of this system that is most characteristic. . . . while the named kin groups persist through time, the actual group that effectively operates together varies widely from season to season, and the amalgamations of one year seldom exactly repeat themselves the next.<sup>58</sup>

The parallels between this flexible system and that which produces and maintains tents and well pulleys are striking. Like

the technology, the kinship system allows the actors in this extreme environment to relate to one another in ways that produce satisfactory results.

There is a serious need for first-hand data on this and other issues which have been raised here. Nomads and 'primitive' peoples world-wide are living on borrowed time, and we may be discovering them only as they are disappearing. There seems to be a particular dearth of ethnography concerning the Saudi Bedouin and their crafts.

Numerous projects have sprung up to encourage the preservation of Bedouin weaving. The Emir of the northern Arabian province of al Jawf, noting the decline of the camel in the local economy, has instituted a camel race and a weaving competition in conjunction with an annual technology exhibition.<sup>59</sup> The al Sadu project in Kuwait has made efforts to record as much of both process and product in weaving as possible.<sup>60</sup> A woman working independently in al Jawf has organized local weavers to weave articles which she collects and sells in her shop to tourists.<sup>61</sup> In some areas government-sponsored workers for the Social Development Centers actively encourage weaving and crafts through instruction and displays; nevertheless there has been a decline.<sup>62</sup> In fact the very existence of so many efforts to encourage the craft would seem to be an indication of just how tenuous its existence is.



Beyond the humanistic motives to preserve and record there are valid practical reasons to obtain more data on Bedouin weaving and the economics which support it. Saudi Arabia is a country experiencing dramatic social change while it tries to preserve some traditional values and plan for a future after the oil wealth is gone. One path it may want to consider is development of what were once subsistence crafts as export industries. This has been done with some success in other developing nations, such as Turkey and Morocco.

In Morocco, a major producer of handwoven rugs, it is estimated that six to seven percent of the labor force is composed of female weavers. By and large these weavers are organized into groups who produce rugs at home which are collected and sold by a contractor or middleman. Such a system, where women work at home and can take care of their children, should be very attractive to a society in which the division of the sexes and the value of the family are still strongly held ideas. But in spite of the numbers of nomadic and settled shepherds in the country, Morocco imports 25% of its wool needs. Thus the profits from weaving are subject to the fluctuations of the world market.<sup>63</sup> In other areas in which changes in economic activities have eliminated hair-producing animals, weaving has disappeared entirely for lack of the raw materials.<sup>64</sup> In the village of Yalálag, Mexico, there is a cultural and economic situation somewhat comparable to that in Saudi Arabia, and a local weaving

industry which is a significant part of the economy. Weaving and secondary techniques such as embroidery are done by local women for a patron-contractor who is the principle link to the tourist markets in Yalálag and Oaxaca. Thus the producers here also are removed from the market, though not because of cultural restrictions. The women practice a traditional craft with accommodation of design, esthetics, and weaving quality to the perceived demands of the market. The system distributes risk as well as benefits fairly evenly to all the participants. But the lack of an information link between the eventual consumer and the weavers results in production of weavings based on the weavers' or patrons' assumptions about what buyers want and are willing to pay for. Nevertheless this system, which produces weaving through a rather complex network of craftsmen and contractors, demonstrates that direct contact between craftsman and consumer is not a necessity for a thriving industry.<sup>65</sup>

Such factors as these must be weighed in the planning of settlement and development projects which will disrupt and replace established economics. But they cannot be considered intelligently if the specifics of supply, production, and process--from the gathering of fibers through the spinning of yarn and decisions on design, to the actual weaving itself--are not known.

## NOTES

<sup>1</sup> Bernard Lewis, The Arabs in History (New York: Harper and Row, 1965), pp. 9-10.

<sup>2</sup> Carleton S. Coon, Caravan: The Story of the Middle East (New York: Holt, Rinehart and Winston, 1958), p. 198; William Mulligan, 'The Bedouin,' in Traditional Crafts of Saudi Arabia, by John M. Topham (London: Stacey International, in press), n. pag.

<sup>3</sup> Motoko Katakura, Bedouin Village (Tokyo: University of Tokyo Press, 1977), pp. 6-7.

<sup>4</sup> Topham, Traditional Crafts.

<sup>5</sup> Robert Reinhold, 'Uncovering Arabia's Past,' New York Times Magazine, Aug. 23, 1981, p. 17.

<sup>6</sup> Reinhold, p. 77.

<sup>7</sup> Ralph M. Roweltt, 'Archeology,' Americana Annual 1979.

<sup>8</sup> R. J. Forbes, Textiles, Vol. IV of Studies in Ancient Technology, 2nd rev. ed. (Leiden, Netherlands: E. J. Brill, 1964), p. 48.

<sup>9</sup> Douglas L. Johnson, The Nature of Nomadism: A Comparative Study of Pastoral Migrations in Southwestern Asia and Northern Africa, Department of Geography Research Paper No. 118 (Chicago: University of Chicago, 1969), pp. 2-3.

<sup>10</sup> Dawn Chatty, 'The Pastoral Family and the Truck,' in When Nomads Settle, ed. Philip Carl Salzman (New York: Praeger Special Studies, 1980), p. 82; Clare Oxby, Pastoral Nomads and Development (London: International African Institute, 1975), p. 1.

<sup>11</sup> Philip Carl Salzman, 'Introduction: Processes of Sedentarization as Adaptation and Response,' in When Nomads Settle, p. 4.



- 12 Louisa Bellinger, 'The History of Threads--Natural Fibers and Filaments,' in Threads of History (n.p.: American Federation of Arts, 1965), p. 34; C. G. Gilroy, The History of Silk, Cotton, Linen, Wool, and Other Fibrous Substances (New York: Harper and Brothers, 1845), pp. 225-226.
- 13 Michael K. David, 'Art of the Nomads,' Hali, 4, no. 2 (1981), p. 142.
- 14 Coon, pp. 88, 93.
- 15 De Lacy O'Leary, Arabia before Muhammad (London: Kegan Paul, Trench, Trubner and Co., Ltd.; New York: E. P. Dutton and Company, 1927), p. 22.
- 16 Bellinger, p. 34; Gilroy, p. 233.
- 17 Bellinger, p. 34.
- 18 Anthony N. Landreau, 'Saudi Arabian Textiles,' in Traditional Crafts of Saudi Arabia, n. pag.
- 19 Forbes, p. 197.
- 20 Gilroy, p. 233.
- 21 H. Ling Roth, Ancient Egyptian and Greek Looms, rpt., 1st ed. 1913 (Halifax, England: Bankfield Museum, 1951), p. 3 ff.
- 22 Kax Wilson, A History of Textiles (Boulder, colorado: Westview Press, 1979), pp. 39-40.
- 23 O'Leary, p. 11.
- 24 Lillian M. Wilson, 'Textiles,' in The Excavations at Dura-Europos, Preliminary Report of Second Season of Work, October 1928-April 1929 (New Haven: Yale University Press, 1931), p. 180.
- 25 Landreau.
- 26 M. G. Konieczny, Textiles of Baluchistan (London: The Trustees of the British Museum, 1979), p. 23; Grace M. Crowfoot, 'Handicrafts in Palestine, Jerusalem Hammock Cradles and Hebron Rugs,' Palestine Exploration Quarterly, January-April 1944, pp. 128-129.
- 27 Landreau.

- 28 Andrew M. Watson, 'The Rise and Spread of Old World Cotton,' in Studies in Textile History, ed. Veronika Gervers (Toronto: Royal Ontario Museum, 1977), p. 357.
- 29 Bellinger, p. 23.
- 30 H. Ling Roth, Studies in Primitive Looms, rpt. 1st ed. 1918 (New York: Burt Franklin Reprints, 1974), p. 63.
- 31 Roth, Primitive Looms, p. 64.
- 32 Albert de Boucheman, Matériel de la Vie Bédouine Recueilli dans le Désert de Syrie, Documents d'Etudes Orientales, 3 (Paris: Institute Français de Damas, 1935), pp. 11 ff.
- 33 Coon, p. 33.
- 34 Shelagh Weir, The Bedouin (London: The British Museum, 1976), p. 49; Grace M. Crowfoot, 'The Vertical Loom in Palestine and Syria,' Palestine Exploration Quarterly, October 1941, p. 141; Roth, Primitive Looms, p. 64.
- 35 Sally Forelli and Jeanette Harries, 'Traditional Berber Weaving in Central Morocco,' The Textile Museum Journal, 4, no. 4 (1977), p. 49; Jean Pommerol, Among the Women of the Sahara, trans. Nancy d'Anvers Bell (London: Hurst and Blackett, Ltd., 1900), p. 299.
- 36 Roth, Egyptian and Greek Looms, pp. 16-17.
- 37 Forelli and Harries, p. 49; Venice Lamb, West African Weaving (London: Duckworth, 1975), pp. 45, 48.
- 38 Landreau.
- 39 Al Sadu Project, Al Sadu (Kuwait: Near Kuwait Museum, [1977]), n. pag. [portfolio on Bedouin weaving in Kuwait]; Louise E. Sweet, Tell Toqaan: A Syrian Village (Ann Arbor: University of Michigan, 1960), p. 120, gives 'shajara' or 'tree' as one of the motifs commonly found in plaster reliefs in Syria. Unfortunately, no further description or illustration is given.
- 40 Al Sadu.
- 41 Landreau.



42 Among Ancient Peruvian textiles are pieces which employ weft ends of weft-faced constructions extending beyond the selvages to become the warps of small warp-faced tabs. Structurally the tabs are simply extensions of the main body; see Raoul d'Harcourt, Textiles of Ancient Peru and Their Techniques (Seattle: University of Washington Press, 1974), p. 157, Pl. 44. This technical tour de force is very distinct from the Arabian examples.

43 Mattiebelle S. Gittinger, 'Selected Batak Textiles: Technique and Function,' The Textile Museum Journal, 4, no. 2 (1975), pp. 15-18.

44 Lamb, pp. 128-129.

45 Lamb, p. 58.

46 Lamb, p. 74; Watson, p. 362.

47 Lamb, pp. 20, 219.

48 Bert Flint, 'The Weaving of Rural Arab Groups in the Tensift River Region of Morocco,' in From the Far West: Textiles and Carpets of Morocco, ed. Patricia L. Fiske, et al. (Washington, D.C.: The Textile Museum, 1980), p. 58.

49 Al Sadu.

50 Bertram Thomas, Arabia Felix: Across the Empty Quarter of Arabia (London: Jonathan Cape, 1932), p. 168.

51 Katakura, p. 118.

52 Donald Powell Cole, Nomads of the Nomads: The Al Murrah Bedouin of the Empty Quarter (Chicago: Aldine Publishing Co., 1975), p. 64; Al Sadu.

53 Pommerol, p. 198.

54 Weir, p. 46.

55 Walter B. Denny, 'Anatolian Rugs: An Essay on Method,' The Textile Museum Journal, 3, no. 4 (Dec. 1973), p. 14.

56 Schuyler V. R. Cammann, 'Symbolic Meaning in Oriental Rugs Patterns, Part I,' The Textile Museum Journal, 4, no. 3 (Dec. 1972), p. 14.

- 57 Heather Lechtman and Robert Merrill, eds., Material Culture: Styles, Organization and Dynamics of Technology (St. Paul: West Publishing Co., 1977), pp. 5-7.
- 58 Cole, pp. 82-83.
- 59 Al Jawf, 'Its Present and Its Future,' (al Jawf, 1975), n. pag.
- 60 Al Sadu.
- 61 Topham.
- 62 Katakura, p. 136.
- 63 Amal Rassam, 'The Silent Workers: Women and Craft Production in Morocco,' in From the Far West: Carpets and Textiles of Morocco, p. 66.
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## APPENDIX I. DYEING WITH LICHENS FROM SAUDI ARABIA

BACKGROUND: Lichens are a symbiotic plant form composed of a fungus and an algae. They grow in wooded areas, on rocks, walls, logs and the sides of trees, and unlike mosses, grow in sunlight. They are particularly sensitive to industrial air pollution. A species of lichen will take one of several distinct morphological forms. Lichens have been used for diverse purposes throughout history, including medicine and food for man and livestock. They are the source of litmus used in chemistry. One of their more common and wide-spread uses historically has been for dyeing. They are still used for this in the British Isles, particularly Scotland, and were so used in this country. Some lichens have the property of yielding a red or purple color when soaked in ammonia. These are called orchils, and have been used alone or in combination with other red and purple dyes for millenia. Some lichens produce yellows, golds, or browns when soaked in slightly acidic water. They are substantive dyes, that is, they do not require a mordant, though they may be used with one. Lichen dyes are not noted for their light-fastness.

The classic authors on the Arabian Peninsula do not specifically mention the use of lichens as a dye source. However, in the fall of 1981 I was given a bag of several ounces of an

unidentified lichen from Saudi Arabia. This was collected in al Hasa Oasis by Barbara Hauke, an American woman living in Dhahran, who was told by the local inhabitants that the lichen was much used as a dye source. The lichen is a foliose, that is, 'leafy', type, shaped a little like a piece of endive, ivory colored on top and dark brown underneath. The color changed little when the lichen was wet. The largest pieces were about  $2\frac{1}{2}$  inches wide, but since most of the pieces were crumbled it was difficult to tell if this is the size to which the species grows. What appeared to be flakes of pine bark were attached to the underneath of most of the lichens, and had to be peeled off with the fingernails. When this was done I had about two ounces of clean lichens.

PROCEDURE: I put one ounce of clean lichen in a covered glass dish, soaked it in two cups of ammonia, and stirred it well. In a few hours the solution was turning a deep maroon. I stirred it daily or more often, occasionally adding water. After a week the ammonia smell had weakened somewhat, and after two weeks I put in an additional half cup of ammonia. The color changed somewhat over the  $3\frac{1}{2}$  week period from purplish to more of a red, but the change was slight. When it seemed likely that it would not change any more, I used the solution for dyeing.

Skeins used for dyeing were all approximately five grams, of single ply rug or tapestry wool.



I divided the entire maceration, both solution and lichens, into three baths. The first bath contained skeins of unmordanted yarn and a skein of tin-mordanted (stannous chloride) yarn. The second bath contained two skeins, one of unmordanted yarn, and one of tin-mordanted yarn, plus the addition of about a tablespoon of sal soda. The third bath contained one skein each of unmordanted and tin-mordanted yarn, plus the addition of about two teaspoons of 28% acetic acid (see table). Each bath was simmered, covered, for about fifty minutes.

Bath		Orchil	Orchil with Soda	Orchil With Acid
Mordant				
None		X	X	X
Tin		X	X	X

At the end of this period I took two unmordanted skeins of yarn from the plain orchil bath, and put one into a boiling bath of alum (potassium aluminum sulfate), and the other into a bath of chrome (potassium dichromate). (This process is called blooming.) These continued to simmer for about twenty minutes, covered (see table).

## Orchil Bath

No bloom	X
Alum bloom	X
Chrome bloom	X

All skeins were cooled in the pot, rinsed in clear water, labeled, and hung to dry. In total, ten five-gram skeins (some extras of plain orchil) were dyed in the original baths. Samples of these colors are included.

I continued by dyeing progressive baths with the leftover dye. The plain orchil bath I used as it was. The orchil-soda and orchil-acid baths were quite small, so I combined them. The resulting bath had a distinctly acidic smell. I dyed skeins of about one ounce in each bath, simmering them one at a time for one hour, cooling them in the pot, rinsing them in clear water, and hanging them to dry. Seven skeins were dyed, one after the other, in each bath, producing a range from deep red to pastel for both baths. The plain orchil bath went very neutral, toward a rust, after two dyeings. The bath containing the left-over chemicals remained pinkish purple as it lightened. Sample of these colors are included.

Prolonged soaking of the lichen in water and acetic acid produced no color.

COLORFASTNESS: Testing for washfastness of the colors was deemed unnecessary; it is unlikely that fastness to washing

would influence the popularity of a dye in so arid a region as the Arabian Peninsula, and there is ample evidence on the textile pieces themselves that dyes used have run when wet. For lightfastness, small samples of each color were stapled to a piece of cardboard, and a smaller piece of cover stock stapled over the cardboard so that half of each sample was covered. These were sent to Arizona where they were exposed to approximately seven hours of direct sunlight daily for a period of about 45 days from late December to mid February.

All colors showed some fading, but the combinations containing tin mordant and the orchil-sal soda combination showed very minimal fading or dulling of intensity. Fading and dulling were greatest for the colors of plain orchil with alum or chrome bloom. However, in no case was the fading so great that the result was drastically different from the original color.

CONCLUSIONS: Whether or not this unidentified lichen was used in Arabia as a dye source, it certainly could have been, since it is both potent and of acceptable lightfastness. In total one ounce of dry lichen dyed over a pound of yarn, about half of it to a deep color. In addition the colors produced are very nice, though dark. It may be that variations in soaking time and chemicals used would produce purer reds or purples than were obtained. Identification of this particular lichen and further research on its possible use are certainly desirable.

An additional problem is the identification of chemicals that might have been used in the Arabian Peninsula as aids in dyeing, although ammonia in the form of camel urine is readily available. Perhaps some of the current projects aimed at documenting or preserving the craft of handweaving will add data on this subject; data already available for other parts of the Middle East may also serve.



# ORCHIL LICHEN DYES

ORCHIL

TIN MORDANT

ALUM BLOOM

CHROME BLOOM

ORCHIL & ACETIC ACID

TIN MORDANT

ORCHIL & SAL SODA

TIN MORDANT



LEFTOVER ORCHIL DYES

PLAIN ORCHIL

ORCHIL WITH CHEMICALS



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## APPENDIX II. IDENTIFICATION OF FIBERS IN SAUDI ARABIAN TEXTILES

A field of inquiry which may yield useful data in the future is the identification and study of fibers used in the Saudi Arabian textiles. This information could help in determining the more recent history of textiles and weaving, as well as the study of the distribution of various breeds of animals and the patterns of dissemination of yarn through trade.

As a preliminary study, twenty some fiber samples from various pieces of Saudi weaving were mounted dry on slides and examined under a microscope at 40× and 100× magnifications. A cursory examination suggested two conclusions:

- 1) That the range of fibers used in the woven pieces is less exotic than might have been thought, including wool, goat hair, camel, and cotton, and apparently not including silk or linen.
- 2) That wool samples from pieces from the different geographical regions showed marked differences in structure, particularly of scales, and in relative size.

Photographic negatives of sufficient quality to be useful were not obtained.



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